Bass Lake
Aquatic Vegetation Management Plan
2006 Update

February 12, 2007

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Executive Summary

Aquatic Control was contracted by the Bass Lake Property Owners Association to complete aquatic vegetation sampling in order to update a lakewide, long-term integrated aquatic vegetation management plan which was created in 2004. Funding for the update was obtained from the Bass Lake Property Owners Association and the Indiana Department of Natural Resources-Division of Fish and Wildlife as part of the Lake and River Enhancement fund (LARE). This update was also created as a prerequisite to continue LARE program funding to control exotic or nuisance species.

Bass Lake is a 1,400-acre natural lake located five miles southeast of Knox, Indiana in the southeast corner of Starke County. Aquatic vegetation is an important component of the Bass Lake ecosystem; however, as a result of many factors this vegetation can develop to a nuisance level. The primary nuisance species within Bass Lake is the exotic plant Eurasian watermilfoil (*Myriophyllum spicatum*). The negative impact of this species on native aquatic vegetation, fish populations, water quality, and other factors is well documented. In Bass Lake, Eurasian watermilfoil has negatively impacted boating, fishing, and swimming. The primary goal of the Bass Lake Property Owner's Association is to reduce the impact of Eurasian watermilfoil by more aggressively managing this nuisance exotic species while preserving and enhancing the native plant community. In the original plan, it was stated that a whole lake fluridone treatment was the best means for controlling Eurasian watermilfoil. IDNR would not permit this type of treatment, so the primary recommendation for plant control was changed to the use of triclopyr herbicide to selectively control Eurasian watermilfoil throughout the lake. This treatment has effectively controlled Eurasian watermilfoil in the treated areas. However, due to the inability to locate and treat every fragment of Eurasian watermilfoil, this species has reached nuisance levels outside of the treatment areas after initial application. This was especially true in 2006 when a second treatment was completed in late summer in order to control new areas of growth. IDNR district fisheries biologists have since agreed that a whole lake fluridone treatment would be permitted in Bass Lake. This type of treatment does not rely on the ability to detect all areas of milfoil growth since this type of treatment establishes a fluridone concentration throughout the lake. If done correctly, a whole lake fluridone treatment will likely provide multiple years of Eurasian watermilfoil control. It is the recommendation of this plan that the Bass Lake Property Owners Association pursue funds to complete a whole lake fluridone treatment in 2007. Detection of new Eurasian watermilfoil invasions will be a primary focus in years following the whole lake treatment.

Table of Contents

List of Figures

List of Tables

1.0 INTRODUCTION

Bass Lake is a 1,400-acre natural lake located five miles southeast of Knox, Indiana in the southeast corner of Starke County. This report was created in order to update the Bass Lake Aquatic Vegetation Management Plan. The plan update was funded by the Indiana Department of Natural Resources Lake and River Enhancement Program (LARE) and the Bass Lake Property Owners Association. The update serves as a tool to track changes in the vegetation community, to adjust the action plan, and to maintain eligibility for additional LARE funds. Items covered include the 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the 2005 update and prior to the appendix.

2.0 2006 SAMPLING RESULTS

Two surveys were completed on Bass Lake in 2006. A Tier I survey was completed in May. This survey allowed for determination of control areas and documentation of changes within the emergent and rooted floating plant community. A second Tier I survey along with a Tier II survey was completed in August in order to document success or failure of the control techniques and to compare 2006 results to the 2005 survey (the 2005 Tier II survey was completed during the same month as the 2006 Tier II survey). A table outlining the scientific and common names of species collected in Bass Lake is listed below.

Table 1. Scientific and Common Names of Species Collected in Bass Lake.

Scientific Name	*Common Name*
Brasenia schreberi	watershield
Ceratophyllum demersum	Coontail
Chara spp.	Chara
Lythrum salicaria	purple loosesrtife
Myriophyllum spicatum	Eurasian watermilfoil
Nuphar variegetum	spatterdock
Nymphaea tuberosa	white water lily
Phragmities australis	common reed
Pontederia cordata	pickerel weed
Potamogeton crispus	curlyleaf pondweed
Potamogeton gramineus	variable pondweed
Potamogeton pectinatus	sago pondweed
Scirpus validus	soft-stem bulrush
Scirpus americanus	American bulrush
Typha latifolia	common cattail

2.1 Spring Survey Results

On May 25, 2006 a Tier I survey was completed on Bass Lake. The Tier I survey revealed 14 distinct plant beds within Bass Lake totaling 1021.0 acres. (Table 2 & Figure 1). Vegetation was present to a maximum depth of 7 feet. Nine different species were observed. Plant beds varied widely in size and species diversity.

Table 2. Bass Lake Tier I Survey Results, May 25, 2006.

Lake Name: Bass	Number of plant beds: 14					Littoral zone max depth: 7'								
Date: 5/25/06	Number of species: 9													
Secchi: 4.0	Littoral zone size: 1,021 acres													
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Plant Bed Size (acres)	**0.3**	**36.0**	**0.4**	**0.3**	**0.4**	**0.4**	**0.3**	**3.0**	**5.0**	**4.5**	**3.0**	**956.0**	**9.0**	**2.5**
bulrush species	1	-	-	-	-	-	1	-	1	-	-	-	-	-
Chara	1	1	1	-	-	-	-	1	1	1	1	1	1	-
common cattail	1	-	-	3	1	-	-	-	1	-	-	-	-	-
common coontail	-	-	-	-	-	-	-	-	-	-	-	1	-	-
curlyleaf pondweed	1	2	1	-	1	-	1	1	1	1	1	1	1	1
Eurasian watermilfoil	1	4	-	-	-	-	1	4	1	4	4	1	4	4
Phragmites	-	-	-	3	-	-	-	-	-	-	-	-	-	-
spatterdock	4	-	1	-	2	4	3	-	3	-	-	-	-	-
white water lily	2	-	3	-	3	1	3	-	2	-	-	-	-	-

*Plant density rating based on score of 1-4 with 1 being least dense and 4 being most dense.

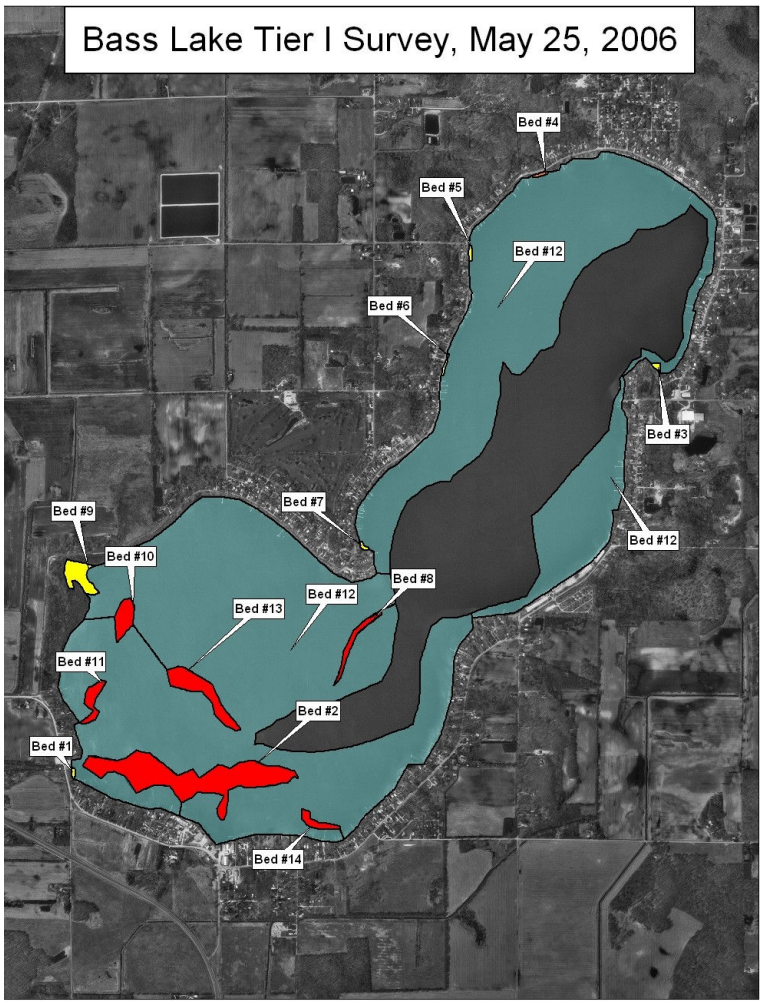

Figure 1. Tier I plant beds, Bass Lake, May 25, 2006.

Several small plant beds dominated by rooted floating vegetation were documented in Bass Lake (beds 1, 3, 5, 6, 7, & 9). These beds were scattered around the lake, but typically were located in areas isolated from wave action. The rooted floating beds encompassed an area of 6.4 acres. Plant bed 9 was the largest rooted floating bed and measured 5.0 acres. This bed was located on the western shore of the south basin (Figure 1). Spatterdock (*Nuphar variegetum*) and white water lily (*Nymphaea tuberosa*) were the most common species within the rooted floating beds.

Plant beds 2, 8, 10, 11, 13, and 14 were dominated by Eurasian watermilfoil (*Myriophylum spicatum*). The only other species present in these beds were Chara, curlyleaf pondweed (*Potamogeton crispus*), and common coontail (*Ceratophyllum demersum*). These dense milfoil beds encompassed an area of 58 acres. These beds were a cause of concern due to the dominance of an exotic species and the fact that the plants were nearly to the surface of the water.

The largest plant bed was bed 12 which was measured and found to be approximately 956.0 acres. This bed was comprised of very sparse vegetation. Curlyleaf pondweed, Eurasian watermilfoil, common coontail, and Chara were scattered throughout this bed at a very low density. Plants likely have difficulty rooting in these areas due to the sandy substrate and wave action.

2.2 Summer Survey Results

Another round of sampling was completed on August 1, 2006. A Tier I and Tier II survey were completed at this time. These surveys were used to document changes in the plant community, assess the effectiveness of vegetation controls, and assist in planning for the 2007 season.

2.2.1 Summer Tier I Survey

On August 1, 2006 a Tier I survey was completed on Bass Lake. The Tier I survey revealed 15 distinct plant beds within Bass Lake totaling 1055.9 acres. (Table 3 & Figure 2). Vegetation was present to a maximum depth of 11.0 feet. Twelve different species were observed.

Table 3. Bass Lake Tier I Survey Results, August 1, 2006.

Lake Name: Bass	**Number of plant beds: 15 Littoral zone max depth: 11.0 ft**														
Date: 8/1/06	**Number of species: 12**														
Secchi: 2.5	**Littoral zone size: 1,055.9 acres**														
Plant Bed I.D.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Plant Bed Size (acres)	**0.5**	**36.4**	**960.0**	**4.3**	**1.1**	**0.7**	**0.4**	**0.3**	**0.5**	**3.9**	**0.3**	**6.6**	**9.5**	**21.8**	**9.6**
Chara	-	1	1	1	-	-	-	1	-	-	-	-	1	1	1
common cattail	-	-	-	-	-	4	4	-	-	-	-	1	-	-	-
Eurasian watermilfoil	-	1	1	4	1	-	-	1	-	4	-	-	4	4	4
phragmites	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-
pickeral weed	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
purple loosestrife	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-
sago pondweed	1	1	1	-	-	-	-	-	-	-	-	-	1	-	2
spatterdock	4	-	-	-	-	-	-	-	4	-	-	2	-	-	-
soft stem bulrush	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
variable pondweed	1	3	1	-	2	-	-	-	-	-	-	1	-	1	-
watershield	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
white water lily	2	-	1	-	4	-	-	4	1	-	4	3	-	-	-

*Plant density rating based on score of 1-4 with 1 being least dense and 4 being most dense.

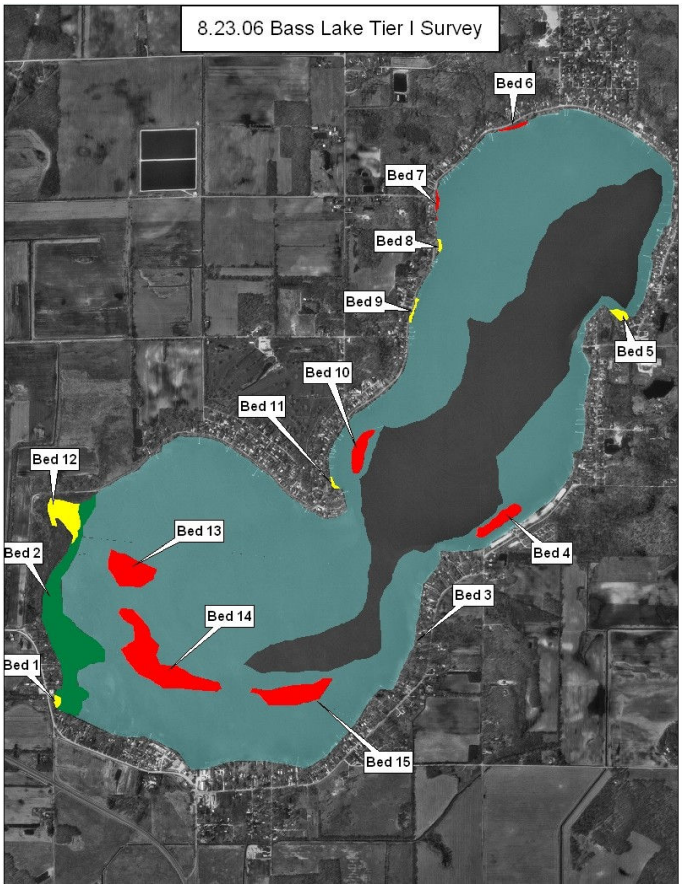

Figure 2. Tier I plant beds, Bass Lake, August 1, 2006.

Basically, the same rooted floating beds that were documented in the spring survey were also present in the summer survey. Beds 1, 5, 8, 9, 11, and 12 were all dominated by either spatterdock or white water lily. These beds of rooted floating vegetation encompassed a total area of 9.3 acres. Bed 12 was the largest and most diverse rooted floating plant bed and measured 6.6 acres. Watershield (*Brasniea schreberi*) was a common occurrence in bed 12.

Plant beds 4, 10, 13, 14, and 15 were dominated by Eurasian watermilfoil (*Myriophylum spicatum*). The only other species present in these beds were Chara, sago pondweed (*Potamogeton pectinatus*), and variable pondweed (*Potamogeton gramineus*). These dense milfoil beds encompassed an area of 49.1 acres. These were not the same beds documented in the spring survey.

There was a noticeable increase in variable pondweed. This species was not even detected in the spring survey. Variable pondweed was most abundant in plant bed 2. This bed was located along the western shore of the south basin and encompassed an area of 36.4 acres. It is not clear why this species has become established in Bass Lake, but it is a beneficial plant to the overall health of the lake.

2.2.2 Summer Tier II Survey

On August 1, 2006 a Tier II survey was completed on Bass Lake immediately following the Tier I sampling. A Secchi disk reading was taken prior to sampling and was found to be at 2.5 feet. Plants were present to a maximum depth of 11 feet. One hundred sites were selected within the littoral zone (57 sites 0-5 ft, 33 sites 6-10 ft, and 10 sites 11-15 ft). According to IDNR protocol, we were to sample 10 sites from 11-15 feet. No vegetation was detected from 12.0-15.0 feet, so future sampling will be adjusted to reflect the actual depth of plant growth. This will likely vary due to water clarity, so no maximum sampling depth can be set at this time. Results of the sampling are listed in Table 4. Overall aquatic vegetation distribution and density is illustrated in Figure 3. The bottom half of Table 3 illustrates the frequency of occurrence and dominance index of individual species at different depth ranges.

Table 4. Bass Lake Tier II survey results, August 1, 2006.

Occurrence and abundance of submersed aquatic plants in Bass Lake						
County:	Marshall	Sites with plants:	49	Mean species/site:	0.75	
Date:	8/1/2006	Sites with native plants:	26	Standard error (ms/s):	0.093	
Secchi (ft):	2.5	Number of species:	6	Mean native species/site:	0.37	
Maximum plant depth (ft):	11	Number of native species:	5	Standard error (mns/s):	0.06	
Trophic status	Mesotrophic	Maximum species/site:	4	Species diversity:	0.64	
Total sites:	100			Native species diversity:	0.53	

All depths (0 to 15 ft)	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
Eurasian watermilfoil	38.0	62.0	20.0	4.0	14.0	17.6
Chara spp.	25.0	75.0	13.0	3.0	9.0	7.2
variable pondweed	9.0	91.0	5.0	2.0	2.0	3.0
spiny naiad	2.0	98.0	0.0	1.0	1.0	0.4
Nitella sp	2.0	98.0	2.0	0.0	0.0	0.4
needle spikerush	1.0	99.0	1.0	0.0	0.0	0.2

Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
Eurasian watermilfoil	32.3	67.7	21.0	3.2	8.1	10.3
Chara spp.	27.4	72.6	17.7	3.2	6.5	8.7
variable pondweed	11.3	88.7	4.8	3.2	3.2	4.2
Nitella sp	3.2	96.8	3.2	0.0	0.0	0.6
needle spikerush	1.6	98.4	1.6	0.0	0.0	0.3

Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
Eurasian watermilfoil	63.0	37.0	25.9	7.4	29.6	37.8
Chara spp.	25.9	24.1	3.7	3.7	18.5	5.9
spiny naiad	7.4	92.6	0.0	3.7	3.7	1.5
variable pondweed	3.7	96.3	3.7	0.0	0.0	0.7

Depth: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
Chara spp.	9.1	90.9	9.1	0	0	1.8
Eurasian watermilfoil	9.1	90.9	0	0	9.1	9.1
variable pondweed	9.1	90.9	9.1	0	0	1.8

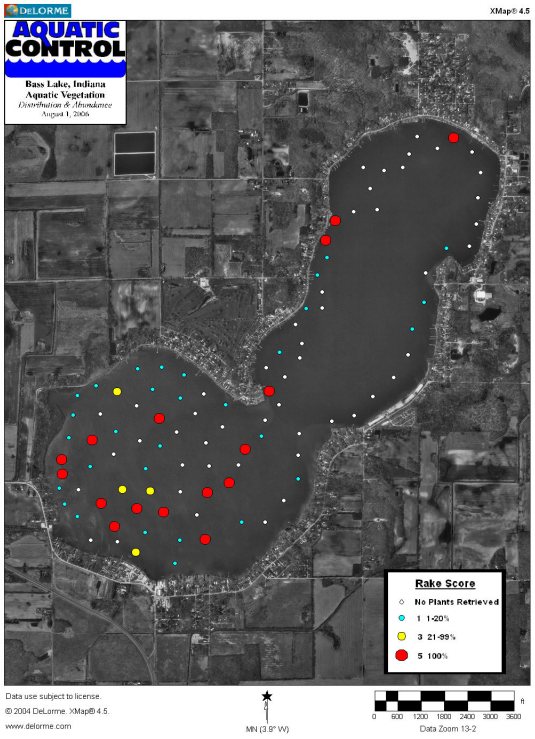

Figure 3. Bass Lake aquatic vegetation distribution and abundance, August 1, 2006.

Six species were collected during the Tier II survey. Eurasian watermilfoil was present at the highest percentage of sample sites (38.0%). Location and density of Eurasian watermilfoil is illustrated in Figure 4 (in species location and density figures, plant location is illustrated by a color coded dot, the color of the dot represents the density of the species and sample sites without that species are illustrated by a smaller white diamond). Chara ranked second in frequency of occurrence. Variable pondweed ranked third in frequency of occurrence and it's location and density is illustrated in Figure 5. Slender spikerush (*Elocharis acicularis*), spiny naiad (*Najas marina*), and Nitella were also collected but found at a small percentage of sites.

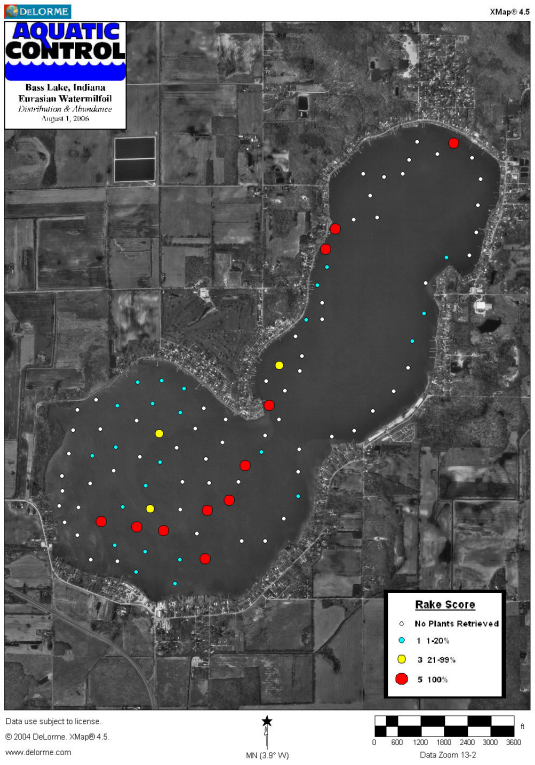

Figure 4. Bass Lake, Eurasian watermilfoil distribution and abundance, August 1, 2006.

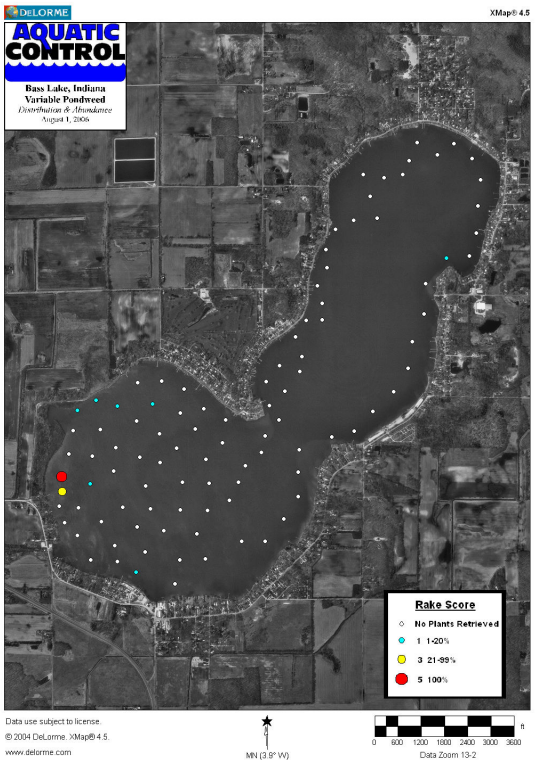

Figure 5. Bass Lake, variable pondweed distribution and abundance, August 1, 2006.

2.3 Aquatic Vegetation Sampling Discussion

In general, the goals of the plan are to reduce nuisance conditions caused by invasive plant species while preserving and enhancing the abundance of beneficial native species. One of the main limiting factors to vegetation growth in Bass Lake is water clarity. It appeared that there was an increase in clarity and this was shown when comparing Secchi measurements taken in the last five surveys (Figure 6). Residents around Bass Lake have recently adopted a sewer system. The new sewer system may be one factor that is improving the overall water clarity. It will be interesting to see if this improvement continues.

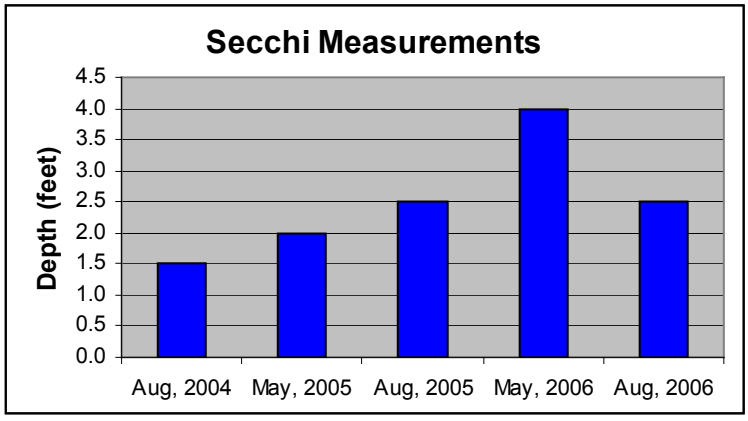

Figure 6. Bass Lake Secchi measurements in the last five surveys.

The increase in water clarity will also allow Eurasian watermilfoil to grow faster and in deeper water. The abundance of milfoil was dramatically decreased last season. This season it was estimated that between 40-50 acres would need treatment. However, following the May survey, it was determined that 58 acres required treatment. Upon completion of the summer survey it became apparent that milfoil had spread to new areas of the south basin that did not receive treatment in the spring. This increase in milfoil abundance is illustrated in Figure 7. The milfoil areas in the south basin were treated a few weeks after the August survey.

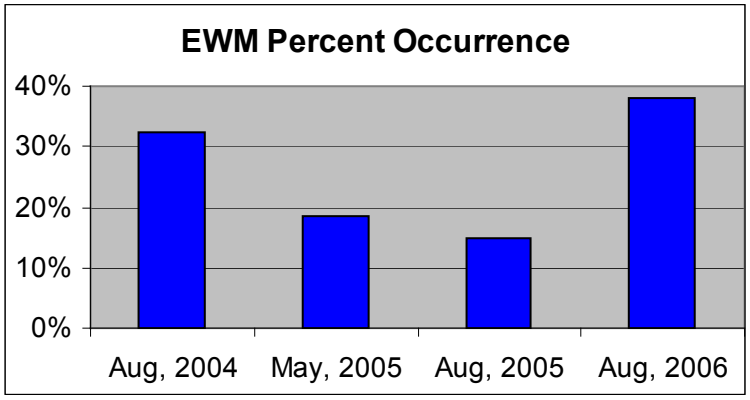

Figure 7. Bass Lake, comparison of Eurasian watermilfoil percent occurrence in the last four surveys.

Bass Lake has a below average density and diversity of submersed aquatic vegetation. However, it appears that this may be changing. The comparison of several metrics, calculated from the Tier II survey results, reflect this potential improvement. Native metrics appear to be increasing or staying about the same when comparing the last four surveys (Figures 8, 9, 10, & 11).

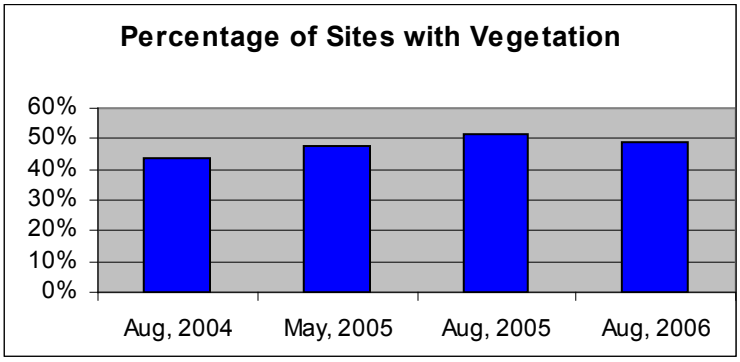

Figure 8. Bass Lake, comparison of percentage of sites with vegetation in the past four surveys.

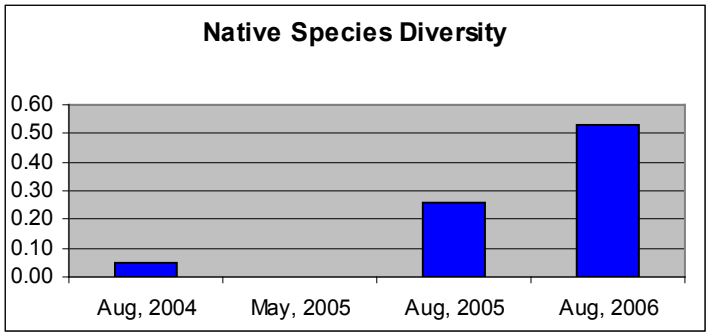

Figure 9. Bass Lake, comparison of native species diversity in the last four surveys.

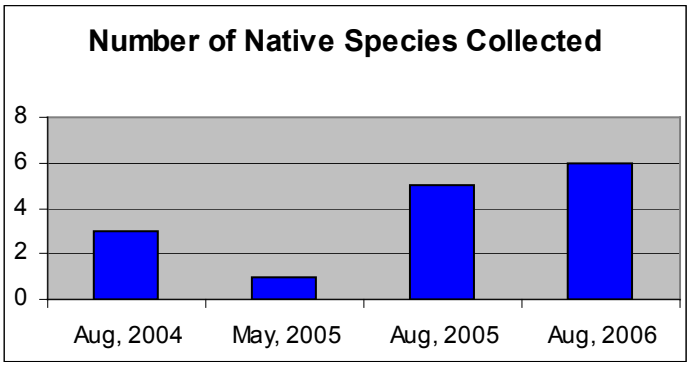

Figure 10. Bass Lake, comparison of number of native species collected in the past four surveys.

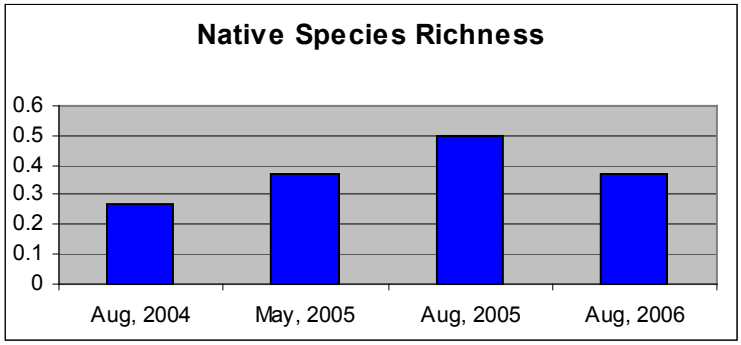

Figure 11. Bass Lake, comparison of mean number of native species collected per site in the past four surveys.

Last season the survey data led us to believe that we were progressing towards meeting the goals of reducing nuisance conditions caused by Eurasian watermilfoil and thus expanding and enhancing the native plant community. However, this season there was an increase in milfoil abundance. The reason for the increase is not entirely clear, but may be the result of an increase in water clarity. The native plant community appears to be expanding despite the increase in milfoil.

3.0 2006 VEGETATION CONTROL

In 2005, Aquatic Control applied Renovate herbicide to 136 acres of Eurasian watermilfoil on June 14. In 2006, it was determined that 58 acres of milfoil would require treatment (this was more acreage than was funded by LARE, so the Association had to pay for the additional 6.2 acres). These areas were mapped out during the spring

Tier I survey (Figure 12). Aquatic Control completed treatment to these areas on June 1. An integrated GPS spray system was used in order to apply the correct dose to the proper area. At the time of treatment the milfoil beds were at, or very near, the surface of the lake.

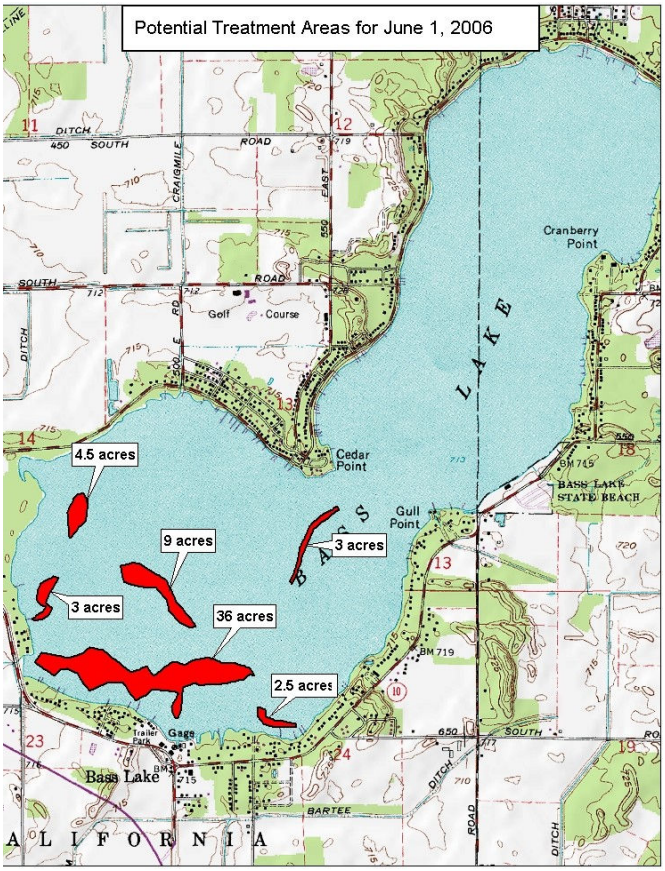

Figure 12. Bass Lake Eurasian watermilfoil treatment, June 1, 2006.

Control of the milfoil was achieved in the treated areas; however, milfoil had reached nuisance levels outside of these areas by the time the summer survey was initiated. The Association decided to fund treatment of these areas due to complaints from lake users. These areas were treated on August 23 with Renovate herbicide. The August 23 treatment area is illustrated in Figure 13, which is a close-up of the south basin. The August 23 treatment areas are highlighted in light red and outlined by waypoint markers and the June 1 treatment areas are highlighted in dark red. Many residents did not believe that the initial treatment worked since the new areas were so close to the original treatment areas. The plant sampling showed good control within the spring treatment areas and illustrated that the areas of nuisance growth were new milfoil beds. The August 23 treatment areas were inspected in early October and no Eurasian watermilfoil was present.

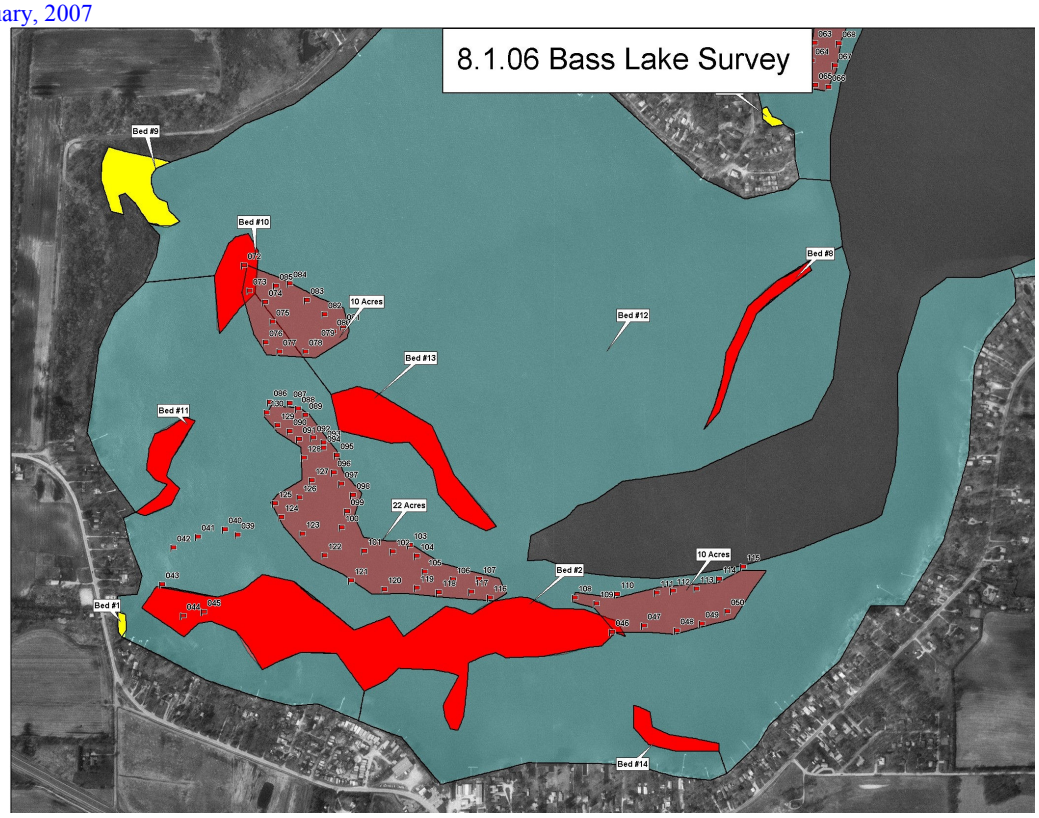

Figure 13. Bass Lake, Eurasian watermilfoil treatment areas (light red), August 23, 2006.

4.0 PUBLIC INVOLVEMENT

A public meeting was held October 30, 2006 at the Bass Lake POA building in Knox, Indiana. Eighteen individuals attended the meeting. The meeting was designed to educate lake users on the LARE program, update them on plant management activities and future planned activities, obtain user input, and to educate property owners on proper lake front property management practices. A user survey was handed out prior to the meeting. Ninety-two percent in attendance had property adjacent to the lake and 92% had been on the lake for 10 years or more. Questions concerning lake use found that 100% of those surveyed used the lake for boating, 100% for swimming, 67% for fishing, and nobody surveyed used the lake for irrigation or drinking. Questions concerning problems with the lake found that 58% thought there were too many plants, 50% too many jet skis, 33% thought there was overuse by non-residents, 33% thought pier funneling was a problem, 17% believed poor water quality was a problem, and none of those surveyed thought there was a problem with the fish population. All of those surveyed wished to continue vegetation control (listed this way in survey form) and 75% thought the level of aquatic vegetation affected their property value. The group was frustrated by the need for treatments in new areas following the spring application. It was the consensus that a different management technique should be attempted that would provide better whole lake control of Eurasian watermilfoil.

Another topic discussed at the public meeting was the recent discovery of Hydrilla (*Hydrilla verticillata*) in Lake Manitou, which is only 22 miles away from Bass Lake.

Hydrilla is an invasive aquatic species that was originally discovered in Florida in the 1960's. There are many characteristics of hydrilla that make it a threat to Indiana waterways. This species can grow in lower light conditions than most native species, grows faster than most native species, and can shade out other species by forming a surface canopy. Hydrilla can be easily confused with native elodea. The best way to distinguish hydrilla is that it typically has five leaves along each whorl along with visible serrated edges along the leaf margin (Figure 14). What makes controlling the spread of hydrilla difficult is the fact that it can be spread by fragments. **That is why it is vitally important that lake users remove all plants and sediment from their boats when entering and leaving Bass Lake.** More information about controlling the spread of Hydrilla can be found at www.protectyourwaters.net.

Figure 14. Illustration of Hydrilla on the left compared to native elodea on the right. Hydrilla typically contains five toothed leaves per whorl while native elodea typically has three leaves per whorl and the teeth are not visible on the leaves (Illustrations provided by Applied Biochemist).

5.0 ACTION PLAN AND BUDGET UPDATE

The 2006 treatments effectively controlled Eurasian watermilfoil in the targeted areas, but new growth was detected in areas outside of the treatment zones by the August survey. This new growth was treated due to complaints from residents about interference with boating and milfoil fragments washing up on shore. The past Renovate and 2,4-D treatments had been effective at controlling targeted areas, but it was not possible or cost effective to treat all areas. Some areas that contained only a few plants, and didn't receive treatment in the spring, spread into much larger areas creating nuisance conditions. In the original plan it was the opinion of the author that a whole lake fluridone treatment would be the most effective means for long-term control of Eurasian watermilfoil. The main reason for that opinion was the fact that one does not have to find and treat every single milfoil plant. A whole lake fluridone treatment is designed to

maintain a low concentration of fluridone throughout the water column thus eliminating the need to find every sprig of Eurasian watermilfoil. Due to the shallowness of Bass Lake and the lack of a continuous outflow, a whole lake treatment is much more cost effective on a per-acre basis (roughly $100/acre for fluridone vs. $425/acre with Renovate). In addition, it has been the experience of the author that this type of treatment will provide a much longer period of control if not complete eradication of Eurasian watermilfoil. This treatment was not approved by IDNR prior to finalization of the final plan, so spot treating with Renovate herbicide was recommended. Since that time, IDNR has seen the positive effects of the whole lake fluridone treatment on other lakes and has indicated that they will approve a whole lake fluridone treatment on Bass Lake in 2007.

Aquatic Control has completed whole lake fluridone treatments on two public natural lakes in Indiana. Webster Lake was treated in 1999 and 2002. Re-infestation of Eurasian watermilfoil happened in three years, but that is because this species was present in the immediate watershed (lakes that contained Eurasian watermilfoil in the immediate watershed were not permitted for treatment). Wolf Lake, a 451-acre lake in northwest corner of Indiana, was treated with fluridone in 2004 and no Eurasian watermilfoil has been detected since the treatment. The long-term success of a fluridone treatment is variable from lake to lake. Since milfoil can spread by fragmentation, success of the treatment is dependent on eliminating all of the plants from the watershed. Bass Lake is a perfect candidate for a whole lake treatment since it has a very small watershed, very little outflow, and is a very shallow lake.

Whole lake fluridone treatments involve detailed planning in order to be effective. It is important to keep fluridone at a relatively low rate in order to limit damage to non-target species. Variable pondweed is the main non-target species of concern. This species should not be damaged if low rates are maintained. In order to complete a successful and environmentally sound fluridone treatment it will be necessary to complete a test to determine the ideal level of fluridone for control of this particular strain of Eurasian watermilfoil. SePRO Corporation manufactures Sonar herbicide and also provides such a test. This test is called the PlanTest. In order to complete the PlanTest, 30-40 growing tips of Eurasian watermilfoil will need to be collected and sent to their laboratory. The test takes 3-4 weeks to complete. The test results will indicate the ideal level of fluridone along with the necessary exposure time. These results will allow the applicator to make a very accurate application. The test should be completed as soon as actively growing milfoil becomes available.

In order to come up with a cost estimate for this plan, we will estimate that between 3 and 6 ppb of fluridone will need to be maintained for 90 days (this number is based on past tests and may be adjusted following the PlanTest). It is likely than one or two bump applications will need to be made during this time frame due to photo-degradation or dilution of the product. This treatment can be adjusted following test results. In order to make accurate adjustments to the treatment one should complete a test to monitor how much fluridone is present in the water column. This type of test is called a FasTest. Two sites should be sampled 7 days after application. This will let the applicator know if they have reached the initial targeted concentration. Two sites should also be sampled three weeks following the first test in order to determine if, when, or how much of a bump treatment is needed. The tests should be completed every three weeks for 90 days

following treatment or until all Eurasian watermilfoil plants have been eliminated. It is estimated that between ten and fourteen tests will be needed.

If the whole-lake fluridone treatment is completed correctly, it is unlikely that milfoil treatments will be required the following season. However, plant sampling will need to be completed in order to insure that no milfoil returns. The area around the public access site should be one of the most thoroughly checked areas due to the potential infestation from boaters. If any plants are detected they should be immediately treated with 2,4-D or Renovate granular herbicide. Plant sampling will be very important for the long-term success of this treatment. Intensive plant sampling along with immediate treatment will prevent the milfoil from ever reaching past nuisance levels. It is recommended that the number of sample points be doubled following the whole lake treatment in order to make for easier detection of new milfoil infestations. This will also be important due to the presence of Hydrilla in nearby Lake Manitou.

In the original plan it was recommended that native aquatic vegetation planting should be initiated in the south basin of Bass Lake. It appears that Mother Nature has taken care of this problem. There was a dramatic increase in variable pondweed on the western side of the south basin during the summer survey (see plant sampling data). Planting of native vegetation can be removed from the budget at this time; however, this item may be explored in the future depending on the success of the pondweed in this area.

It is important that residents of Bass Lake realize that native vegetation will likely expand following the whole lake fluridone treatment. This native vegetation may reach nuisance levels. Native submersed vegetation is very important for the overall health of the lake and should be preserved if it is not severely impacting overall lake use. However, if the plants become perilous to boating and/or swimming, it is legal for homeowner's to remove 625 square feet of vegetation without a permit. We don't anticipate more than $2,000-$3,000 per year would be needed for control of native vegetation.

There have not been any recent fish surveys on Bass Lake. Ideally, a survey would be completed prior to the whole lake treatment and then several years after the treatment in order to assess any changes in the fishery.

It is recommended that the Association request a grant for $175,000.00 for a whole lake fluridone treatment to be completed in 2007 along with $4,000.00 for plant sampling (see Table 5). Due to LARE budget limitations, it may not be possible for this treatment to be fully funded. In order to be sure that the treatment is completed next season, the Association should plan on funding, at the very least, $155,000.00.

Table 5. Proposed Bass Lake Plant Management Budget.

	2007	2008	2009	2010
Herbicide & Application Cost	$175,000*	$0**	$0**	$10,000**
Vegetation Sampling & Plan Update	$4,000	$4,000	$4,000	$4,000
Native Vegetation Control	-	-	$3,000	$3,000
Total:	**$179,000**	**$4,000**	**$7,000**	**$17,000**

*Includes FasTest, PlanTest, and whole lake fluridone treatment
**Includes cost of treating potential Eurasian watermilfoil re-infestation. This cost could vary widely.

AQUATIC CONTROL

6.0 Appendix Update
6.1 2006 Sampling Data
August Tier II Data

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	POCR3	CEDE4	CH?AR	NAMI	NAMA	ELAC	POGR8	NI?TE
Bass Lake	8/1/06	41.212826	-86.609276		41	2.0	1				1					
Bass Lake	8/1/06	41.213769	-86.607065		42	4.0	5	5			1					
Bass Lake	8/1/06	41.214802	-86.605027		43	6.0	3	1			2		1			
Bass Lake	8/1/06	41.216297	-86.602871		44	5.0	1	1			1					
Bass Lake	8/1/06	41.214678	-86.602432		45	7.0	3	3								
Bass Lake	8/1/06	41.213424	-86.603708		46	6.0	5	5			1					
Bass Lake	8/1/06	41.212109	-86.605782		47	5.0	5	1			5					
Bass Lake	8/1/06	41.211068	-86.608031		48	2.0	0									
Bass Lake	8/1/06	41.210974	-86.605522		49	3.0	0									
Bass Lake	8/1/06	41.210197	-86.603794		50	4.0	3	1			1				1	
Bass Lake	8/1/06	41.211650	-86.602964		51	5.0	1	1								
Bass Lake	8/1/06	41.213137	-86.601194		52	9.0	5	5			1					
Bass Lake	8/1/06	41.214615	-86.599643		53	3.0	0									
Bass Lake	8/1/06	41.216569	-86.599419		54	3.0	0									
Bass Lake	8/1/06	41.216485	-86.596920		55	3.0	0									
Bass Lake	8/1/06	41.214586	-86.597091		56	11.0	5	5								
Bass Lake	8/1/06	41.212932	-86.598114		57	15.0	0									
Bass Lake	8/1/06	41.211089	-86.599714		58	5.0	1	1			1					
Bass Lake	8/1/06	41.209397	-86.600141		59	1.0	1	1								
Bass Lake	8/1/06	41.211155	-86.597293		60	5.0	5	5								
Bass Lake	8/1/06	41.212412	-86.593892		61	6.0	1				1					
Bass Lake	8/1/06	41.212401	-86.591675		62	2.0	0									
Bass Lake	8/1/06	41.213984	-86.589939		63	13.0	0									
Bass Lake	8/1/06	41.215546	-86.588606		64	6.0	1	1								
Bass Lake	8/1/06	41.217295	-86.588574		65	3.0	0									
Bass Lake	8/1/06	41.218868	-86.588479		66	3.0	0									
Bass Lake	8/1/06	41.219767	-86.585445		67	10.0	0									
Bass Lake	8/1/06	41.220197	-86.583332		68	6.0	0									
Bass Lake	8/1/06	41.221564	-86.581567		69	6.0	0									
Bass Lake	8/1/06	41.222957	-86.579618		70	4.0	0									
Bass Lake	8/1/06	41.224628	-86.578313		71	4.0	0									
Bass Lake	8/1/06	41.226499	-86.577870		72	8.0	1	1								
Bass Lake	8/1/06	41.228461	-86.576808		73	3.0	1	1								
Bass Lake	8/1/06	41.230596	-86.576630		74	9.0	0									
Bass Lake	8/1/06	41.232404	-86.574695		75	6.0	1	1							1	
Bass Lake	8/1/06	41.232571	-86.572532		76	11.0	0									
Bass Lake	8/1/06	41.234177	-86.571883		77	3.0	0									
Bass Lake	8/1/06	41.236106	-86.571742		78	4.0	0									
Bass Lake	8/1/06	41.237920	-86.571501		79	15.0	0									
Bass Lake	8/1/06	41.239446	-86.572294		80	10.0	0									
Bass Lake	8/1/06	41.240500	-86.573985		81	5.0	5	5								
Bass Lake	8/1/06	41.239691	-86.575560		82	6.0	0									
Bass Lake	8/1/06	41.240562	-86.577421		83	2.0	0									
Bass Lake	8/1/06	41.239306	-86.578183		84	4.0	0									
Bass Lake	8/1/06	41.238321	-86.578798		85	4.0	0									
Bass Lake	8/1/06	41.238104	-86.580516		86	4.0	0									
Bass Lake	8/1/06	41.238329	-86.582482		87	3.0	0									
Bass Lake	8/1/06	41.236778	-86.581836		88	5.0	0									
Bass Lake	8/1/06	41.235241	-86.581196		89	6.0	0									
Bass Lake	8/1/06	41.235067	-86.583378		90	6.0	0									
Bass Lake	8/1/06	41.234437	-86.585081		91	6.0	5	5			1					
Bass Lake	8/1/06	41.233022	-86.585995		92	6.0	5	5			1					
Bass Lake	8/1/06	41.231724	-86.585897		93	9.0	1	1								
Bass Lake	8/1/06	41.230454	-86.586784		94	5.0	1	1								
Bass Lake	8/1/06	41.229225	-86.586318		95	7.0	0									
Bass Lake	8/1/06	41.228044	-86.586331		96	12.0	0									
Bass Lake	8/1/06	41.228005	-86.587852		97	9.0	1	1								
Bass Lake	8/1/06	41.226851	-86.588854		98	4.0	0									
Bass Lake	8/1/06	41.225465	-86.588240		99	14.0	0									
Bass Lake	8/1/06	41.224395	-86.588446		100	13.0	0									
Bass Lake	8/1/06	41.224794	-86.590316		101	9.0	1	3								
Bass Lake	8/1/06	41.223683	-86.591599		102	4.0	0									
Bass Lake	8/1/06	41.223015	-86.589861		103	14.0	0									
Bass Lake	8/1/06	41.221974	-86.591287		104	10.0	5	5								
Bass Lake	8/1/06	41.220980	-86.590409		105	14.0	0									
Bass Lake	8/1/06	41.219832	-86.591693		106	2.0	0									
Bass Lake	8/1/06	41.218684	-86.592062		107	10.0	1	1								
Bass Lake	8/1/06	41.217745	-86.593530		108	8.0	5	5								
Bass Lake	8/1/06	41.216564	-86.594210		109	4.0	0									
Bass Lake	8/1/06	41.215296	-86.595042		110	9.0	5	5								
Bass Lake	8/1/06	41.218203	-86.597263		111	3.0	0									
Bass Lake	8/1/06	41.219364	-86.595689		112	2.0	0									
Bass Lake	8/1/06	41.220957	-86.595404		113	2.0	1				1					
Bass Lake	8/1/06	41.221743	-86.597454		114	3.0	0									
Bass Lake	8/1/06	41.220343	-86.598250		115	3.0	0									
Bass Lake	8/1/06	41.218988	-86.600010		116	3.0	0									
Bass Lake	8/1/06	41.217975	-86.601521		117	3.0	1	1								
Bass Lake	8/1/06	41.218323	-86.603428		118	3.0	0									
Bass Lake	8/1/06	41.219983	-86.601583		119	6.0	5	3			1		1			
Bass Lake	8/1/06	41.221470	-86.599663		120	3.0	1	1								
Bass Lake	8/1/06	41.223161	-86.599300		121	2.0	1	1			1					
Bass Lake	8/1/06	41.223709	-86.601370		122	2.0	1	1			1					
Bass Lake	8/1/06	41.222110	-86.602224		123	3.0	1	1			1			1	1	
Bass Lake	8/1/06	41.220912	-86.603763		124	3.0	0									
Bass Lake	8/1/06	41.219005	-86.605677		125	4.0	1	1			1					
Bass Lake	8/1/06	41.217349	-86.605873		126	3.0	0									
Bass Lake	8/1/06	41.216449	-86.608108		127	3.0	1								1	
Bass Lake	8/1/06	41.218412	-86.607902		128	4.0	5	1			5					
Bass Lake	8/1/06	41.220295	-86.607150		129	3.0	0									
Bass Lake	8/1/06	41.221936	-86.605561		130	3.0	3	1			1				1	
Bass Lake	8/1/06	41.223594	-86.603663		131	3.0	1	1			1					
Bass Lake	8/1/06	41.222357	-86.607530		132	2.0	1								1	
Bass Lake	8/1/06	41.221637	-86.609298		133	12.0	1				1				1	
Bass Lake	8/1/06	41.220206	-86.609712		134	2.0	1									1
Bass Lake	8/1/06	41.218564	-86.610116		135	3.0	1				1					
Bass Lake	8/1/06	41.217002	-86.610741		136	3.0	5								5	
Bass Lake	8/1/06	41.215947	-86.610680		137	4.0	5				3				3	
Bass Lake	8/1/06	41.214868	-86.611011		138	2.0	1									1
Bass Lake	8/1/06	41.214750	-86.609198		139	2.0	0									
Bass Lake	8/1/06	41.213717	-86.610484		140	2.0	1				1					

6.2 VEGEGETATION CONTROL PERMIT APPLICATION

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987
[x] Whole Lake [ ] Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

Return to: Page 1 of 2
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Bass Lake Conservancy District	Bass Lake Conservancy District	
Rural Route or Street		Phone Number
3620 South County Road 210		812-497-2410
City and State		ZIP Code
Knox, IN		46534
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County	
Bass Lake	Knox	Starke	
Does water flow into a water supply		[ ] Yes	[X] No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's	Whole Lake
Total acres to be controlled	1400	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late May

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Whole lake sonar treatment to include pre-treatment PlanTest and in-treatment FasTest in order to monitor conc.

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Data collected during 2006 summer survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian Watermilfoil	X	50
Chara spp.		30
Nitella		1
Slender spikerush		1
Spiny naiad		2
Variable pondweed		10
white water lily		2
spatterdock		2
watershield		2

Page 2 of 2

Treatment Area #	LAT/LONG or UTM's	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

☐ Approved ☐ Disapproved	Fisheries Staff Specialist
☐ Approved ☐ Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

AQUATIC CONTROL